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Gold Price, Inflation, and Dollar Exchange Rate: The Case of Gold Investment in Indonesia

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This paper aims to investigate the relationship between gold price, inflation and the dollar exchange rate on gold stock price of PT Aneka Tambang Indonesia. The ARDL time series model is used in the study involving PT Aneka Tambang Indonesia from December 2016 to November 2019. The findings show the price of gold doesn't have a significant effect on the gold stock price while dollar exchange rate and inflation have a negative effect on the short and long term of the gold stock price of PT Aneka Tambang Indonesia.

Keywords: *Gold Price; Inflation; Dollar Exchange; Gold Stock Price*

JEL Classification: G32, C22

Introduction

The act of investment is done by a number of funds at the moment with the goal of obtaining future profits. Generally, investment is divided into two namely investment in financial assets and investment in real assets. Investment in the financial assets takes place in money and capital markets. Meanwhile, investment in real assets takes place in the form of productive assets, opened up mines, plantation, and so on (Halim, 2005).

In Islamic perspective, investment activity is highly encouraged and recommended in order to develop assets. On the contrary, Islam forbids idling funds, including capital, in essence of the funds being unproductive. Islam also forbids to hoard and heaping property because these actions are seen as wasting the gift of God and could possibly harm the economy because it could inhibit the growth of capital (Aziz, 2010). Regarding to these issues, a lot of people become indecisive to choose investment instruments ranging from deposits, precious metals (gold), property, business, bounds, and stock (Wira, 2015).

Historically, the price of gold in Indonesia is on a constant uptrend annually. This fact encourages the public are to invest in gold instrument in hope for future profit and the capital gain of gold. But there is a contrary argument that stated gold as an "outdated" instrument as other sharia-based instrument such as sharia stocks are on a constant rise over the last few years, encouraging a lot of people to invest in the sharia capital markets (Khuron, 2015).

Stocks are one kind of investment instrument that have many advantages, making it very popular among investors. First of all, in-

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vestors can choose the company to invest his funds. Choosing companies with good performance is an essential part to create profit from stock investment. Secondly, another advantage of investing in stocks is investors will receive dividends, a part of net income generated by the company, counted as a form of profit gained from the investment. Finally, investors could get an opportunity to sell their ownership of the stocks at higher price, called as capital gain (Kalaka, 2015).

PT Aneka Tambang (ANTAM) is an established mining company that has a diversified line of business. The company has also integrated vertically in terms of their business model and is export-oriented in terms of obtaining revenue. Through its widely-spread operating areas, the company's activities include exploration, mining, processing, and marketing of precious commodities such as: nickel ore, ferronickel, gold, silver, bauxite, and coal. The company has a loyal consumer base in Europe and Asia. Considering the vast land of mining concessions and the large amount of natural resource reserves owned, the company formed several joint ventures with international partners to be able to utilize existing reserves into profitable mines. To support funding for the ferronickel expansion project, in 1997 PT ANTAM offered 35% of its shares to the public and listed them on the Indonesia Stock Exchange. PT ANTAM is included in the Jakarta Islamic Index in December 2016 (Komariah, 2014).

JII (Jakarta Islamic Index) was created by the IDX in cooperation with PT Danareksa Investment Management and launched on July 3rd, 2000. JII prioritizes a January 1995 basis with an initial value of 100. JII is updated every 6 months containing 30 issuers of company shares that meet investment criteria based on sharia (Utami and Nugraha, 2011).

Cai et al. (2001) published a study aiming to explain the behavior of the gold market. They found that the price of gold was influenced by employment reports, gross domestic product, consumer price index, and personal income as having the greatest impact. Rao and Nagabhushanam (1960) find that demand rises dramatically with income but decreases with prices. Using cross-country data, Balassa (1990) found that investment in gold was higher when real interest rates were negative.

Other than an instrument of investment, previous researches explain correlation between gold and inflation. Mahdavi and Zhou (1997) conducted a conclusive study to find the effectiveness of gold and other commodities as indicators of inflation and concluded that gold is a good indicator of inflation. In addition, Adrangi et al. (2003) found a positive correlation between gold prices and inflation expectations while Batten et al. (2014) found tha when the rate of return falls, the relationship between inflation and the price of gold becomes strong. Ranson (2014) also conclude that gold is the best barrier to curbing inflation. Their research shows that an increase in the price of gold can reach two to three times higher than inflation. McCown and Zimmerman (2006) found a significant relationship between the approach of inflation and the price of gold, while Tully and Lucey (2007) used the GARCH approach and found no significant relationship between inflation and gold. Mo et al. (2018) found that the relationship between the price of gold and the US dollar is constantly changing as of before 2004, they showed a very weak relationship. However, it changes into a strong negative relationship in early 2006. Furthermore, Smith (2001) found that the price of gold had an influence on the stock market. As it shown in the study, the price of gold has a negative influence on the American stock market. Finally, Murtini and Amijoyo (2012) stated that there is a negative relationship between gold prices and stock returns.

Inflation rate is proved to be one of the determinants that affect stock prices. Sunariyah (2006) proves that inflation affects stock prices in two ways: directly and indirectly. Directly, inflation causes a decrease in profitability and purchasing power of money, while indirect effect of inflation affects through changes in the interest rate. If the company's profitability decreases, it will have a significant impact on dividend received by investors. This condition has the potential to attract capital investments and divert funds to other types of investments

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that provide better returns. Subsequently, it will make the capital market climate become sluggish. In addition, Martinez (2008) found that inflation has a significant effect on stock prices. In his study, Reilly (1997) conducted a study with a different result as the study stated there was a positive relationship between inflation and stock prices based on the assumption that the inflation that occurred was demand pull inflation.

Along with the stock prices, inflation also affects gold as described by a study conducted by Dienrick et al. (2012). The study stated a volatile world inflation rate could cause an increase in demand for gold, causing the price of gold to increase. Eventually, the increase in the price of gold will increase when the price level increases in the USA and the world.

Exchange rate is the value of a nation's currency in terms of the currency of another nation or economic zone. Fuadi (2009) found that the exchange rate showed a negative effect on stock returns. Furthermore, Thobarry (2009) found that the IDR/USD exchange rate had a positive effect while inflation had a negative effect on stocks.

This study aims to investigate the relationship between gold price, inflation and the dollar exchange rate on gold stock price. Previous research conducted by Levin and Wright (2006) stated that the demand for gold as an investment asset will be influenced by many factors such as the dollar exchange rate, inflation, the rate of return on assets, etc. In contrast to gold used for jewelry, electricity raw materials, etc., the demand for gold is more influenced by price volatility. This paper would examine the relationship between gold price, inflation, and dollar exchange rate on the stock price of PT Aneka Tambang Indonesia listed in JII index. The first part of the paper would describe the main purpose of the research. Next, the second part of the paper would give the reader a concise literature review on the variables used in the study. The third part of the paper would discuss the methods used in the study. Afterwards, the fourth part of the paper would show the results of the study. Finally, the final part of the paper would serve a conclusion for the study.

Literature Review

Sharia Stock

Aloui et al. (2015) explained that sharia stock is an investment instrument in form of shares issued by companies that follow sharia compliance throughout their business operations. Examples of criteria of on sharia stock are: the company must be willing to be transparent in displaying its interest-hearing debt, its interest liabilities, impure income, or trade debts.

Narayan et al. (2016) stated that Sharia stock also known as the Dow Jones Islamic Stock Price. Sharia stock included in the Dow Jones Islamic Stock Market World Price Index must meet Sharia compliance in Islamic Investment, among others, stock issuers are prohibited from getting income involving alcohol, cigarettes, pork products, there are activities with conventional financial systems (banking and insurance), weapons and entertainment activities are limited to 5%.

According to Erdogan et al. (2015), sharia stock is a form of development in the financial system in terms of investment instrument other than banking and insurance. It is argued that the Islamic financial system becomes attractive to Islamic stock investors mainly because of its reliability in its system. According to Raza et al. (2015), Islamic stock continues its rapid growth on a global scale. One of the most essential features of the Islamic stock index is that it has proven to be more insensitive of financial crisis than the conventional stock markets. Furthermore, Chen and Lim (2016), argues that Sharia stock is shown to have a low risk due to the application called Muamalat and has the chance of diminishing forest failure rates.

Stock Price

Stock return is the profits gained by the investor on the stock investment. Alkhazali et al. (2020) stated that The Dow Jones Islamic Market index (DJIMI) is part of the Dow Jones Global Indices group which has a special characteristic of being an index based on a low debt, non-financial and ethical considerations. The

DJIM index is generated using the capitalization weighted method and disseminated to major market data vendors in real time. Shares that are allowed to enter the DJIMI list have criteria that do not carry out activities, namely involving interest in banks and their income, gambling, production of weapons, pork, a debt to assets ratio of more than 33%, and a ratio of receivables to assets exceeding 45%. Investors' purpose in investing is to maximize returns, without forgetting investment risk factors that must be addressed. Return is one of the factors that motivates investors to invest and is also a reward for the courage of investors to bear the risk of their investments.

The sources of investment return consist of two components, as follows (Tandelilin, 2001):

1. Capital gains/losses are gains or losses for investors which are obtained from the excess selling price or buying price above the price or selling price, which both occur in the secondary market. In other words, capital gain/loss is interpreted as a change in the price of securities.
2. The yield is income or cash flow that is received by investors periodically, for example in the form of dividends or interest.

Gold Price

Price is the amount of money received by the seller and the proceeds from the sale of a product or service, that is, sales that occur at a company or place of business. The price is not always the price that actually occurs in accordance with the agreement between the seller and the buyer (Sholihin, 2010). Meanwhile, according to the Big Indonesian Dictionary (KBBI) the price is the value of goods that are determined or forgotten by money (Ministry of National Education, 2011).

From several definitions of prices, it can be concluded that the price is the value of an item or service that determines the amount of money paid or received by the seller for the product sold, both the price set by the seller and the outcome of a bargain between the buyer and seller. Thus, the price of gold is the amount of money that is sacrificed or paid to get goods or products in the form of gold. The price of gold is very volatile, which always changes every day. Therefore, the price is determined so that it can be balanced according to demand and supply.

Inflation

Inflation is defined as an increase in the money supply or an increase in liquidity in an economy (Suseno, 2009). This definition refers to a general phenomenon caused by an increase in the money supply that is thought to have caused an increase in prices. In future developments, inflation can be briefly translated as a tendency to raise prices for goods and services in general and in a sustainable manner (Astiyah, 2009).

In that sense, there are two important concepts that are fundamental in terms of understanding inflation. The first is "general price increases" and the second is "sustainable". With inflation there is an element of price increase and then the increase of the price in general. Only the price increase that usually occurs can be called inflation. It is important to distinguish the increase in certain goods and services. The second keyword is "sustainable", the price increase occurs due to seasonal factors. Index numbers are used to measure changes in inflation over time in general. The index number is determined by counting the number of goods and services that will be used to calculate the value of inflation. Changes in the index figures from time to time, expressed as a percentage are defined as the inflation rates for the period (Bank Indonesia, 2009).

Dollar Exchange Rate

The exchange rate is considered as the amount of currency that can be exchanged to get another currency or the price obtained to get another currency (Fabozzi, 1996). Rupiah exchange rate is the exchange rate of one currency that is converted to another country's currency. For example, the exchange rate of the rupiah against the US dollar. This exchange rate is an indicator that affects the activity of the stock market and money market, because investors tend to be careful when investing.

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Relationship between Variables

Effect of Gold Prices on Stock Prices

Smith (2011) found that the gold price had a negative influence on the stock market. This is because an increase in the gold price causes a tendency to choose to invest in gold compared to investment in stocks because the gold price is relatively more stable and the stock market tends to fluctuate and risky. The price of gold is an indicator to determine future stock prices. An increase in gold prices will raise the prediction of stock prices in the future.

H1: There is a significant positive effect between the price of gold on stock price in the short term and long term.

Effect of Inflation on Stock Returns

Unexpected inflation will also cause an unexpected price increase and cause the stock price to rise as well. Batten et al. (2014) found the relationship between inflation on return is negative. This happens when the rate of return falls, the relationship between inflation and the price of gold becomes strong. Gulseven (2016) reinforces that inflation makes returns from gold less than 4%.

H2: There is a significant negative effect between inflation on stock price in the short term and long term.

Effect of Dollar Exchange Rate on Stock Returns

Fuadi (2009) found that the exchange rate showed a negative effect on stock returns. This is because the depreciation of the domestic currency causes an increase in costs and prices compared to abroad. This increase in costs causes the tendency for people to invest to decrease. Thobarry (2009) found that the IDR/USD exchange rate had a positive effect while inflation had a negative effect on stocks. Weakening of foreign currencies causes domestic currencies to be increasingly favored by investors. More and more investors are choosing a domestic currency to increase the company's cash inflows and increase the company's power to improve performance.

H3: There is a significant positive effect between the exchange rate of the dollar on stock price in the short and long term

Research Methods

Sample Selection and Data Sources

The data in this quantitative research is in the form of time series of monthly data obtained from several sources, namely inflation and exchange rate data obtained from the Bank Indonesia (BI) website, for stock price data and gold prices obtained from websites investing. com and PT Aneka Tambang Tbk (PT ANTAM Tbk There are the data sample criteria used in this research :

1. The company's shares have been trading for about 2 years
2. The company's shares were actively traded during the observation period to find out the closing price
3. Gold trading company shares

i. Gold Price

This study uses the gold price standard in Indonesia, namely the price set by PT. Aneka Tambang Tbk by using a calculation formula as follows :

$$\textit{Gold Price} : \frac{\textit{The final gold price per day in a month}}{\textit{the number of days in a month}}$$

ii. Inflation

Inflation according to Bank Indonesia is inflation must have an element of the price increase and then the increase is the price in general and to calculate the value of inflation obtained from changes in the index number determined by calculating the number of goods and services to be used from time to time and expressed in percentage that period.

$$\textit{Inflation} : \frac{CPI_n - CPI_{n-1}}{CPI_{n-1}}$$

iii. Dollar Exchange Rate

Dollar exchange rate is the value of 1 piece of currency from the United States Dollar that can be purchased by the currency of Indonesia. The dollar exchange rate has a strong influence on gold investment. Dollar exchange rate fluctuations occur every day so to get the Dollar exchange rate uses the following formula:

$$\textit{Dollar exchange rate} : \frac{\textit{The final Dollar exchange per day in a month}}{\textit{the number of days in a month}}$$

iv. Stock Price

Stock prices on the market are very much determined by market forces, which means the strength of demand and supply. Because the supply and demand for stocks fluctuate every day, the stock price will follow the fluctuation pattern. In conditions where there is more demand for stocks, the stock price tends to increase, while in conditions where there are more stock offers, the stock price tends to decrease (Irwansyah et. al, 2014).

Methods

This study uses a quantitative approach. Quantitative methods are research methods based on the philosophy of positivism, by which certain populations or samples can be examined with quantitative or statistical instruments for the acquisition and analysis of data and certain hypotheses can be tested (Sugiyono, 2011). The purpose of this study is to determine the effect of the price of gold on the Indonesian market, inflation in Indonesia and the dollar exchange rate in the gold stock return of PT ANTAM JII Index. The research period of the study is from December 2016 until November 2019.

The ARDL equation model used in this study is as follows:

$$SP_t = \alpha_0 + \alpha_{1t} + \alpha_1 GoldPrice_{t-1} + \alpha_2 DollarExchangeRate_{t-1} + \alpha_3 Inflation_{t-1} + \varepsilon_t \quad (1)$$

Whereas:

SP_t = Stock price of PT ANTAM in JII time t

$GoldPrice_{t-1}$ = Price of gold at time t-1

$\text{Dollar Exchange Rate}_{t-1}$ = Dollar exchange rate at time t-1

$Inflation_{t-1}$ = Inflation at time t-1

ε_t = random disturbance term

Types and sources of data used in this study are quantitative data sourced from secondary data (time series). Time series data is data that consists of one object but covers several time periods. The data used is a monthly data from the official website of Indonesia Central Bank, Investing.com, and PT Aneka Tambang.

ARDL is a regression method that incorporates lags from both dependent and independent variables altogether. Using this model, we can analyze the long-term relationship when the explanatory variables are a mixture of those that are I (1) and I (0). The ARDL estimator will produce a consistent long-term coefficient. One of the advantages of the ARDL approach is that it produces consistent estimates with good long-term coefficients regardless of whether the explanatory variables or regressors are I (0) or I (1). In the case of a long-term relationship that is trend stationarity, with ARDL, detrending on the series can be done and modeling the detrended series as stationary distributed lag (Falianty, 2003).

Broadly speaking, the steps that will be carried out for econometric analysis using this method are as follows:

1. Test the stationarity of data variables in the research model, both at the level stage and the first difference stage.
2. Determine the optimum lag with the Lag Length Criteria VAR method.
3. Estimating ARDL models, including model selection and diagnostic tests to test whether there are violations of basic assumptions econometrics, before proceeding to the next procedure.
4. Analyze the output results of the ECM esti-

Table 1. Result of Stationarity Test (Unit Root Test)

No.	Variable	Augmented Dickey-Fuller (ADF)		Phillips Perron	
		at level	1st difference	at level	1st difference
1.	*Stock price*	0.0138*	0.0003*	0.0515	0.0000*
2.	*Gold price*	0.5711	0.0000*	0.5640	0.0000*
3.	*Dollar exchange rate*	0.8102	0.0000*	0.7947	0.0000*
4.	*Inflation*	0.1810	0.0005*	0.0903	0.0005*

*p-value < 0.05. Stationer on 5% level.
Source: Author's estimate (2020)

Table 2. Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-567.7254	NA	2.49e+13	39.36037	39.50182	39.40467
1	-504.4048	109.173400	5.91e+11	35.61413	36.17990	35.79132
2	-499.8723	6.876932	8.24e+11	35.92223	36.91234	36.23232
3	-490.7905	11.900340	8.70e+11	35.91658	37.33103	36.35957
4	-479.9952	11.912040	8.64e+11	35.79277	37.63155	36.36865
5	-474.0146	5.361931	1.31e+12	36.00101	38.26412	36.70978
6	-445.6118	19.588110*	4.93e+11	34.66288	37.35033	35.50456
7	-422.9269	10.951340	3.61e+11	33.71910	36.83087	34.69367
8	-379.2906	12.037600	1.13e+11*	31.33039*	34.86650*	32.43785*

mate to find out the dynamics short-term.
5. Estimating the coefficient of a long-term relationship from the ARD Model

Results and Discussions

Descriptive Analysis

Stationarity Test (Unit Root Test)

The first step in this research is stationarity test. The test used in the study is Augmented Dickey Fuller (ADF) test and another similar test is Phillips-Perron test. Both tests indicate the existence of a unit root as a null hypothesis. The result of stationarity test is shown in table 1.

Based on table 1, four variables (stock return, gold price, dollar exchange rates, and inflation) is proven as stationary on the first difference, whether using Augmented Dickey-Fuller (ADF) or Phillips Perron. Also, it is shown stock price variable is stationary at level. It is shown by the probability value that is higher than α (5%). Because of the variable is proven to be stationary on the first difference and one variable is stationary on a level (at level), then the analysis method that can be used in this model is using ARDL (Autoregressive Distributed Lag).

Determination of Lag Length

In determining ARDL regression, it is necessary to choose number of lags that will be used to in the analysis as shown in Table 2. Lag optimum is a way to choose the number of lags that can be used in the research to obtain the best result. This research finds the lag optimum value based on the lag length criteria VAR value. Based on Table 2, the most optimum lag value is lag 1.

ARDL Model Diagnosis Test

Before carrying out further ARDL analysis, we need to do a diagnostic test of the ARDL model to find out whether the ARDL model produced is a suitable and perfect model. To do a diagnostic test, we first need to check the Bound Test results. Bound Test is used to see the percentage of significance that can be used for the examined variables we examine. The Bound Test results in Table 3 show an F-statistic which is quite large, that is 5.020772. This value is much greater than the lower limit of the values at I0 and I1. This shows that the ARDL estimation results can be used up to the significance of α = 1%, and this result also shows that between variables have a long-term co-integration relationship.

Table 3. ARDL Bound Test

Test Statistic	*Value*	*K*
F-statistic	5.020772	2

Critical Value Bonds

Significance	*I0 Bound*	*I1 Bound*
10%	2.63	3.35
5%	3.10	3.87
2.5%	3.55	4.38
1%	4.13	5

Table 4. Long-term Estimation of ARDL

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob*
X1_Gold_Price	0.0009180	0.000513	1.789035	0.0844
X2_Dollar_Exchange_Rate	-0.2005530	0.064460	-3.111285	0.0358
X3_Inflation	-0.4836389	80.368250	-6.017786	0.0038
C	0.5217590	1165.665000	4.476064	0.0110

Analysis of ARDL

Using this model, we can analyze the long-term relationship when the explanatory variables are a mixture of those which are I (1) and I (0). The ARDL estimator will produce consistent long-term coefficients and the resulting estimates are consistent regardless of the explanatory variables or with I(0) or I(1) regressor. Table 4 below shows the results of the long-term estimation of ARDL.

The long-term estimation of ARDL from Table 4 shows that the variable gold price does not have a significant effect on stock price. Whereas the dollar exchange rate variable and inflation rate has significant negative effect on stock price. Using the ARDL results shown in Table 4, the authors can construct the following equation:

$$\begin{aligned}\text{Cointeq} = {} & \text{Y\_STOCK\_PRICE} \\ & -(0.00918*\text{X1\_GOLD\_PRICE} \\ & -0.200553*\text{X2\_DOLLAR\_EXCHANGE\_RATES} \\ & -0.4836389*\text{X3\_INFLATION} \\ & +0.521759)\end{aligned} \quad (2)$$

The results of this study show a similar result to the prior research conducted by Alkhazali and Zoubhi (2020). The ownership of gold as a part of Sharia stock portfolio can diversify more risks and prove that gold is a safe and stable hedge and investment asset for Muslim investors during the financial crisis period of 2007-2009. This shows that the stability of gold in the form of stocks is the right choice for investors in a distressed condition of financial crisis.

According to Levin and Wright (2006), countries listed as the main consumers of gold gained benefit when their currencies are depreciated against the US dollar. The research shows that gold serves as a hedge of exchange rate movements in several countries in the world.

Conclusions

This study aims to analyze the effect of the gold price, inflation, and the dollar exchange rate on the gold stock price of PT Aneka Tambang JII Index. In this study, the author uses a quantitative approach and uses the ARDL (Autoregressive Distributed Lag) method. Based on the results of this study, it can be concluded that the price of gold has not a significant effect on the short term and the long term on the gold stock price of PT Aneka Tambang JII Index on the period of December 2016 - November 2019. Furthermore, the dollar exchange rate and inflation have significant positive effect on the short and long term on gold stock price of PT Aneka Tambang JII Index on the December 2016 - November 2019.

Implication

Based on the results of this study, it is strongly advisable that regulatory institutions would be able to develop Islamic capital markets and Islamic stocks in Indonesia in order to help the investor's needs, and can develop rapidly in the next era and compete with conventional stock and capital market products. For the public, this research is aimed at providing the right insights and decisions in investing in PT ANTAM in the Indonesian Islamic capital market. The second party is the general public and academics, which is expected that the community and academics assess this research as a source of literature on Islamic stock price of PT ANTAM and its investment development. From this study, it can be shown that changes in gold stock price at PT ANTAM are influenced by several things such as the dollar exchange rate and inflation.

The dollar exchange rate and inflation show a negative effect on stock prices based on the results of short-term and long-term research with ARDL. So if investors want to buy gold stock when the condition of the dollar exchange rate and inflation increases, followed by a decrease in the gold-stock price it becomes an opportunity for investors who want to add investment assets in the form of gold-stock because they can buy it at a low price on the stock market. And vice versa when the dollar exchange rate and inflation decline and is followed by an increase in the gold-stock price, investors can sell the gold stock or maintain it because the gold-stock price trend always increases even though it fluctuates.

However, the movement of PT ANTAM stock price fluctuatesSuggestions for investing in the capital market, especially stocks, are investing for the long term, not trading on short term because this is causes the capital market to be speculative and not in accordance with Islamic principles.

1. Based on the opinion of Levin and Wright (2006), they support the opinion that the lower the exchange rate of our country against the US dollar, the more profitable investors will respond by increasing investment in assets in the form of gold. Gold assets are also supported by Alkhazali and Zoubhi (2020) proved to be a safe investment for investors even during the financial crisis in 2007-2009.
2. For academics, gold stock price research is still very rarely researched and needs further study on the effect of the gold price, inflation and the dollar exchange rate on gold stock returns. For further research, we hoped that this research model can be developed so that the highest effect factor on gold stock price can be obtained.

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